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Research paper

Comparison of low intensity laser therapy and trigger point injection in the management of myofascial pain syndrome

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summary Myofascial Pain Syndrome (MPS) is quite a common clinical manifestation characterised by the presence of trigger points (TrP), muscle spasm, tenderness, motion restriction, weakness and autonomic dysfunction. The ideal therapy should be fast, cheap and long-term effective. Local anesthetic injection and low-intensity laser therapy are two types of such treatments.

Aim: The main purpose of this study was to compare the effectiveness of TrP injection and low intensity laser therapy in patients with MPS.

Method: 43 patients (14 men, 29 women) diagnosed as MPS were included in this study. In the first group (23 cases), laser therapy was applied for 3 min to each TrP within 12 sessions. In the second group (20 cases), 1 ml prilocaine 2% was injected to the TrP once a week for four consecutive weeks. The evaluation was made before the treatment (BT), after the treatment (AT) and sixth months after the treatment (SMT). Effectiveness of treatment was evaluated by a visual analog scale (VAS), a pressure algometer (AL), and a verbal pain scale (VPS).

Results: Outcomes and curative effects of BT and SMT were statistically significant and similar in both groups ($p < 0.05$). No side effects were observed in either group.

Key words: Myofascial pain syndrome; injection; laser therapy.

introduction

Myofascial Pain Syndrome (MPS) is characterised by hypersensitive points, also known as trigger points (TrPs), which are found in one or more muscles and/or tendon tissues. Pain generally radiates to an area away from the TrP. TrPs may either be active or latent depending on the clinical situation. When stimulated, TrPs cause referred pain and a local twitch response.

MPS is frequently observed. Its frequency among the patients admitted to a chronic pain center is about 85%.[1–3] Engagement with exhausting and repetitive work and being female have been shown to be the most important factors contributing to the development of MPS.[4]

TrP injection is one of the most effective methods in MPS treatment and yields good results.[1] The primary objective in the injection treatment is to localise TrPs and inactivate them. Local anesthetic infiltration of TrPs is used to relieve both immediate pain and long-lasting pain.[5]

A laser is used in the treatment of some illnesses. It is claimed that the laser provides an analgesic and anti-inflammatory effect by increasing pain

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threshold in sensory nerve endings, by stimulating the electrolyte exchange in the cell protoplasm and thus increasing the metabolism.[6] In addition to this, laser irradiation stimulates collagen production, alters DNA synthesis, and improves the function of damaged neurologic tissues.[7] The use of a laser is, therefore, suggested in various musculoskeletal dysfunctions, in the treatment of soft tissue lesions, arthritis and neurological disorders.[6] MPS has recently become one of the areas of laser treatment. No matter what method is used, in order to maintain a long-term effect, both laser treatment and TrP injection have to be combined with stretching exercises of the related muscle.

The purpose of this study is to compare the effectiveness of the injection and the laser therapy methods in the treatment of MPS.

materials and methods

Forty three patients (29 females and 14 males) who had been diagnosed with MPS in the neck, shoulder or back muscles at Physical Medicine and Rehabilitation Clinic of Gulhane Military Medical Academy (GMMA) Haydarpasa Training Hospital were included in the study. The mean age of the patients was 34.83 ± 8.97 years in the laser group and 32.60 ± 8.58 years in the injection group. There was no statistically significant difference between the groups. All patients gave informed consent and the GMMA Ethical Committee approved the study.

Pain intensity and pain threshold were evaluated before treatment (BT), after the treatment session, and at six months. A visual analogue scale (VAS) and verbal pain scale (VPS) were used for pain evaluation. Pressure pain threshold was measured by means of a pressure algometer (AL) (Baseline, USA) in kg. VAS was a 10 cm horizontal line and 0 was considered as 'no pain', and 10 as 'maximum tolerable pain'. VAS scores were measured in cm. In the algometer, the diameter of the contact area was 1 $cm,^2$ and covered with 2 mm thick rubber to minimise irritation of the skin. The pressure of compression was increased gradually at a speed of 1 kg/s approximately. The patient was asked to say 'yes' when he or she began to feel pain or any discomfort. In VPS measurement, the patients were asked to grade their pain by choosing, from among five words (light, disturbing, irritating, terrible and torturing) given in a five-scale format from 1 to 5, the word that best described the pain they felt when questioned.

Forty-three patients were randomly divided into two groups. The laser (Elettronica Pagani 1r-27) plus exercise group was composed of 23 patients and the injection plus exercise group was composed of 20 patients. The patients were told not to take any analgesic during the treatment.

The patients were instructed in posture and stretching exercises for neck, shoulder and back muscles. They performed the exercises daily (3 intervals with 10 repeats of every movement) during the treatment period and during the following 5 months. Whether they were doing the exercises correctly or not was checked during their treatment and control visits.

The laser group was treated with a total of 12 sessions stimulating TrPs in the neck, shoulder and back muscles, 3000 Hz and 150 s per point 3 times a week and every other day for 3 min.

One ml prilocain (citanest 2%) was injected within the TrPs in the other group once a week during the following 4 weeks. Once the patient confirmed that the pain was relieved after the injection, it was concluded that the injection had reached the TrP.

statistical analysis

The numerical variables are presented as mean $\pm$ SD. A paired Student's t-test was used for comparing the clinical variables before and after treatment. The Mann–Whitney U-test was used for comparisons between groups.

A p-value < 0.05 was considered statistically significant. SPSS software, version 11.0 (SPSS Inc., Chicago, IL, USA) was used for all statistical calculations.

results

Demographic data are shown in Table I. After the treatment, 65.2% of the patients in the laser group and 55% in the injection group reported pain relief. Although the results obtained from the laser therapy were better, the difference between the groups was not statistically significant ($p > 0.05$). In both groups there was a statistically significant difference between the results of all parameters immediately after the treatment and six months after the treatment compared to before the therapy ($p < 0.01$). Additionally, there was no significant difference between the laser group and injection group for any parameters ($p > 0.05$), except the algometric measurement scores after the treatment ($p < 0.05$).

No statistically significant difference was observed between the laser and injection groups for all variables ($p > 0.05$) at the six month evaluation.

VAS and pain threshold (measured by the AL) for both groups before, immediately after treatment and six months after the treatment are shown in Table II, and verbal pain scale results in Table III.

AL values of the laser group were found to be relatively higher than those of the injection group and were sustained after the treatment as well.

discussion

The purpose of this study was to compare the efficacy of laser therapy and TrP injection in the treatment of MPS. The patients in the study were evaluated before the treatment, immediately after the treatment and 6 months after the treatment. Shoulder, back and neck stretch, and posture exercises were performed by all the patients.

Hakguder *et al*.[8] applied laser therapy and streching exercises and streching exercises alone in two groups patients with MPS. They concluded that laser therapy seemed to be beneficial for pain in MPS.

In his review article, Criscuolo[9] mentioned botulinum toxin injection, acupuncture and laser therapy in the treatment of MPS.

Table I.
Demographic characteristics of the patients

		Laser + exercise	Injection + exercise	p
Age (years)		34.83 ± 8.97	32.60 ± 8.58	$p > 0.05$
Gender	Male	5 (21.7%)	9 (45.0%)	$p > 0.05$
	Female	18 (78.3%)	11 (55.0%)	
Duration of pain (months)		33.51 ± 29.46	27.72 ± 12.52	$p > 0.05$

Table II.
Mean ± SD of the visual analogue scale (VAS), and of the pressure pain thereshold of patients with myofascial pain syndrome in the groups receiving laser therapy and injection therapy

	Before treatment		After treatment		Six months after treatment	
	Laser $n = 23$	Injection $n = 20$	Laser $n = 23$	Injection $n = 20$	Laser $n = 23$	Injection $n = 20$
VAS score (cm)	6.12 ± 1.57	5.90 ± 1.34	2.18 ± 1.63^{a}	2.77 ± 1.57^{a}	2.09 ± 1.49^{a}	2.35 ± 1.26^{a}
Pain threshold (kg/cm^2)	1.407 ± 2.81	1.464 ± 1.74	$2.766 \pm 4.34^{a,b}$	2.414 ± 4.18^{a}	2.765 ± 5.35^{a}	2.558 ± 4.59^{a}

[a] Statistically highly significant difference in comparison to before treatment ($p < 0.01$).
[b] Statistically significant difference between laser and injection group (in favor of laser group) ($p < 0.05$).

Table III.
Distribution of the groups with respect to the verbal pain scale for both groups before, immediately after and six months after the treatment

	Groups	Mild pain	Moderate pain	Severe pain	Very severe pain	Worst possible pain	p
Before treatment	Laser	—	1 (4.3%)	13 (56.5%)	4 (17.4%)	5 (21.7%)	
							$p > 0.05$
	Injection	—	2 (10.0%)	14 (70.0%)	1 (5.0%)	3 (15.0%)	
After treatment	Laser	15 (65.2%)	7 (30.4%)	1 (4.3%)	—	—	
							$p > 0.05$
	Injection	11 (55.0%)	6 (30.0%)	2 (10.0%)	1 (5.0%)	—	
6th month	Laser	15 (65.2%)	7 (30.4%)	1 (4.3%)	—	—	
							$p > 0.05$
	Injection	12 (60.0%)	7 (35.0%)	1 (5.0%)	—	—	

Simunovic[10] applied low-intensity laser therapy to the TrPs of 243 patients with MPS. In his study, he observed that the amount of pain reduction measured by VAS was over 70% in acute pain and over 60% in chronic pain.

Thorsen *et al.*[11] applied six laser and six placebo treatments to tender points in the neck and shoulder girdle to 47 female laboratory technicians with MPS. They concluded that laser treatment and placebo yielded similar results. In our study, a significant reduction in VAS score was observed in both groups ($p < 0.01$). It was also concluded that laser treatment was as effective as injection treatment, which was known to be effective and widely applied in clinical practice.

TrP injection is one of the most popular traditional treatment methods used in MPS treatment. However, its invasive and painful nature makes it necessary to look for other forms of treatment. Laser treatment, no less effective than the injection method, can be suggested in place of the painful TrP injection treatments.

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